

Microturbines in Los Angeles

ASME Turbo Expo

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Presented by Terrence Brungard



Presentation Overview

- LADWP Overview
- LADWP's DG Policy and Program
- Benefits of DG
- Concerns with DG
- LADWP's Microturbine Program
- Microturbines in the LADWP Market
- Lopez Canyon Microturbine Project

LADWP Overview

- Largest Municipal Utility in the U.S.
- Fully Integrated GT&D Services
- 7000MW Generating Resources
(Coal, Gas, Hydro, Nuclear & Renewables) Serving 5600MW Peak Load
- Annual Load Growth 70MW
- 1.5 Million Customers
- \$2.2 Billion Annual Retail Electric Revenue

LADWP's DG Policy

LADWP:

- Believes that DG can play an important role in meeting future load growth. The IRP stipulates that 50% of future load will be met by a combination of DG, energy efficiency, and renewables.
- Recognizes the need of developing and maintaining a level of expertise on DG to ensure safety and customer satisfaction.

John Ferraro Building Fuel Cell Field Trial

Field Trial of FCE's 250kW Molten Carbonate Fuel Cell Plant



Main Street Fuel Cell Installation

200 kW Phosphoric Acid UTC Fuel Cell Power Plant



LADWP's DG Program

Includes

- Demonstration Program
 - Installed: FC 1 MW / MT 2 MW / PV 3 MW
- Customer Program
 - 300 MW on system, primarily larger cogen

Projections

- 3 MW per year of new customer installed DG

Terminal Island Fuel Cell Installation

FCE Fuel Cell being converted to operate off of Digester Gas



John Ferraro Building Fuel Cell

North America's First Commercial Fuel Cell, Efficient 250kW Molten Carbonate Fuel Cell Plant



Benefits of DG

Consumer Benefits

- Reduce Energy Bills
- Use Waste Heat
- Use On-Site Fuel
- Improve Power Quality/Reliability

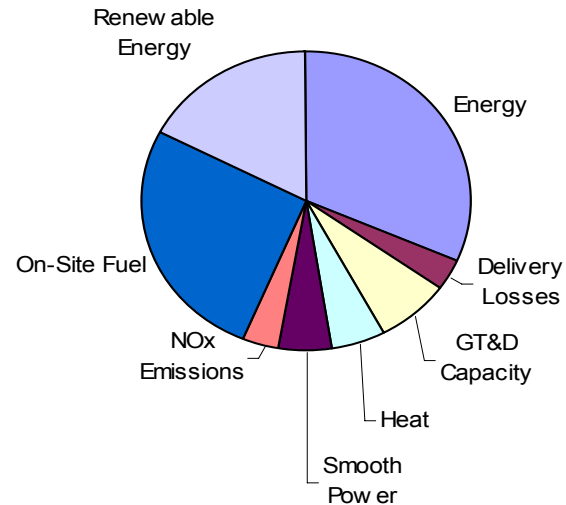
Utility Benefits

- Added Capacity
- Reduced Fuel Costs
- Reduced NOx Emissions
- Reduced Delivery Losses

Community Benefits

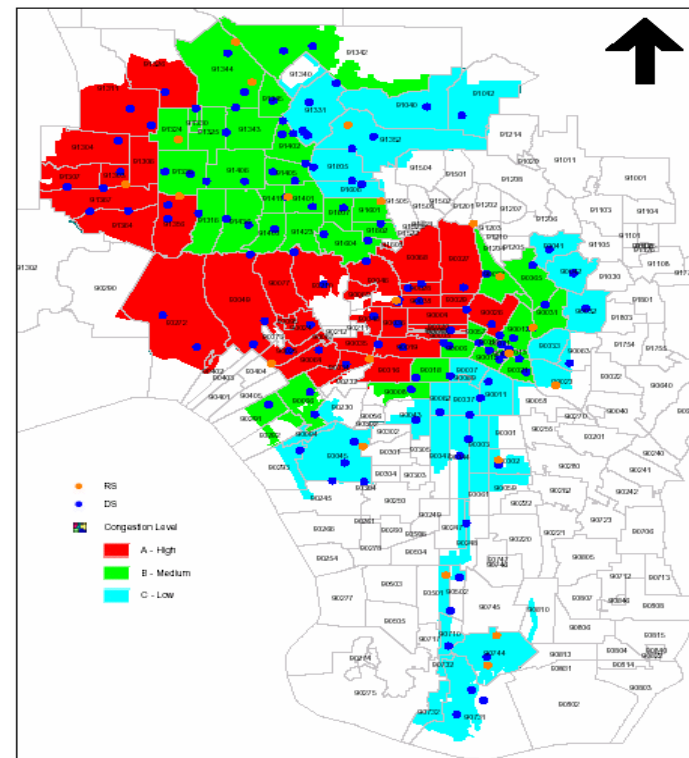
- Improved Air Quality
- Utilize Renewable Fuels

Benefits of DG

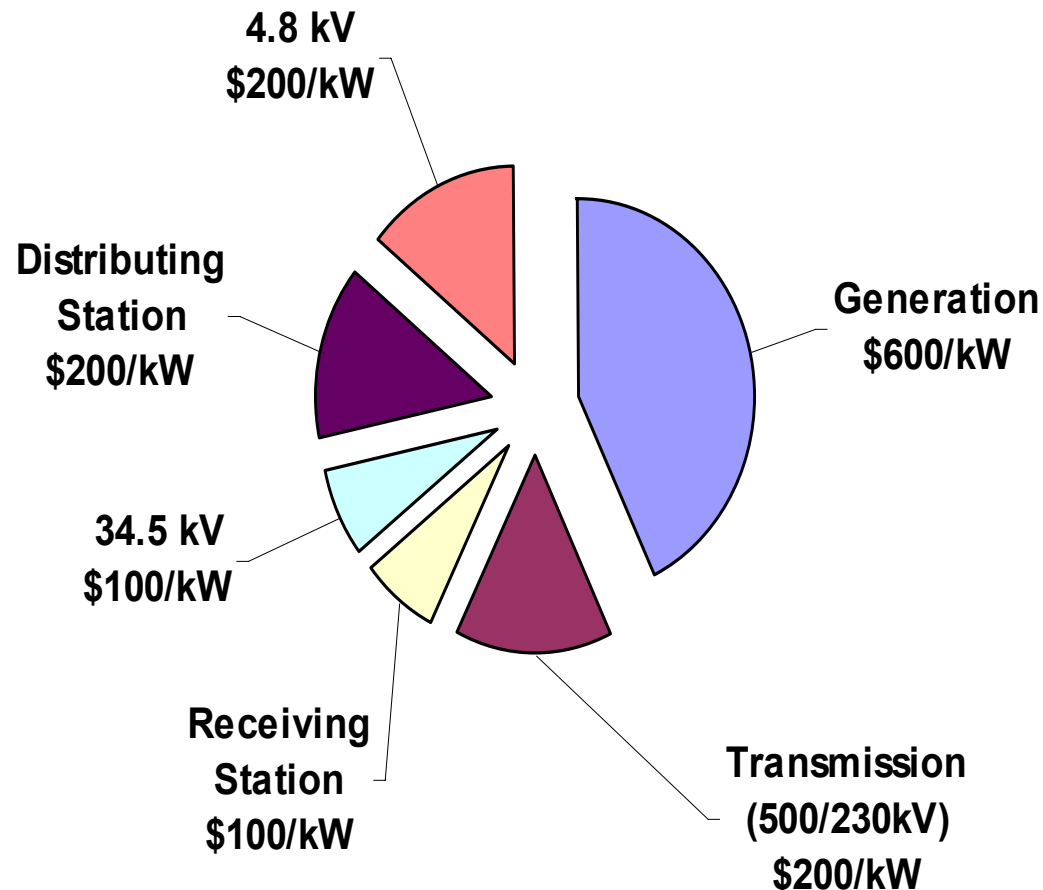
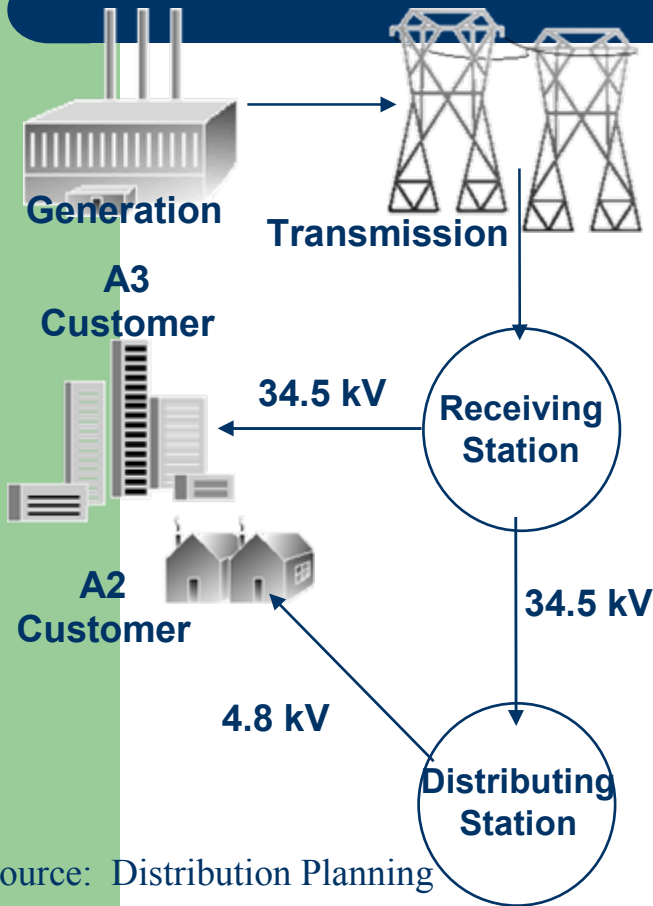


LADWP Distribution System Congestion Areas

- **Red = High Congestion**
- **Green = Medium Congestion**
- **Blue = Low Congestion**



GT&D Infrastructure Costs (\$/kW) High Congestion Area



Source: Distribution Planning

Utility Concerns with DG

- Safety and System Protection
 - Protection against back feeding into the grid
- Costs
 - Equipment purchase
 - Financing
 - Installation
 - Engineering, permitting, testing, interconnection
 - Operating and maintenance
 - Fuel purchases (if any)

LADWP's Microturbine Program

Purpose

- Obtain information on Reliability, Availability and Maintenance of Microturbines
- Expand established relationships with MT manufacturers by exchanging data for technology improvements.

Installations

- Nearly 2 MW of microturbines
- 50 MT's at Lopez Canyon 3 MT's at Valley Service Center
3 MT's at Main St. DG Test Facility 3 MT's at JFB
- Currently all Capstone MT's
- Previous experience with 75 kW Honeywell MT

Valley Service Center DG Test Facility

Three 30kW Capstone Microturbines



Microturbines in the LADWP Market

- With a stable, low cost electric supply, and the high cost of natural gas, the market for MT's and DG in Los Angeles is not significant today
- Niche opportunities exist for customers with needs for highly reliable and high quality electricity and waste heat applications
- LADWP will continue to pursue MT's to reduce the need for GT&D infrastructure improvements and to utilize landfill gas

Lopez Canyon Landfill Renewable Energy Facility

Fifty 30kW Capstone Microturbines that Utilize Landfill Gas



Lopez Canyon Generating Station

- Located at LA Bureau of Sanitation Landfill
- Largest Microturbine Project as of 2002
- The facility includes: 50 MT's, 2 compressors (150HP), 2 after coolers, 5 gas dryers, 4 siloxane & organic removal tanks, 2 electric meters, communications, 200 gal condensate tanks and piping, and landfill gas control and HDPE piping systems.

Challenges with Lopez Canyon Microturbines

- Entrapped moisture and siloxanes
- Competition from others for landfill gas
- Low BTU gas, MT's tended to flare out as methane content drops toward 30%
- Required development of a new field with better gas (50% methane) blended to about 45%